

AMENDMENTS TO THE CLAIMS

1 1. (Currently Amended) A method for marking one or more packets of data in a
2 packet-switched network based on achieved flow bandwidth information within
3 the network, comprising the computer-implemented steps of:
4 receiving a first group of one or more packets of a data flow ~~from~~ at a router in the
5 network;
6 marking the first group of one or more packets of said data flow with a first
7 behavioral treatment value, wherein the first behavioral treatment value
8 directs devices within the network to treat the first group of one or more
9 packets with a first quality of service treatment;
10 transmitting the first group of one or more packets of said data flow in the
11 network;
12 determining an achieved flow bandwidth for the data flow based on data traffic
13 within the network;
14 determining packet flow characteristics of the first group of one or more packets
15 of said data flow;
16 determining a second behavioral treatment value based on the achieved flow
17 bandwidth for the data flow within the network and on the packet flow
18 characteristics of the first group of one or more packets of the data flow;
19 receiving a second group of one or more packets of said data flow ~~from~~ at the
20 router in the network;

21 marking the second group of one or more packets of said data flow with said
22 second behavioral treatment value, wherein the second behavioral
23 treatment value directs devices within the network to treat the second
24 group of one or more packets with a second quality of service treatment
25 that is different than the first quality of service treatment; and
26 transmitting the second group of one or more packets of said data flow in the
27 network; and
28 repeating the preceding steps for successive groups of one or more packets of said
29 data flow, wherein each of the successive groups is dynamically marked
30 with a behavioral treatment value that is determined based at least in part
31 on a successively determined achieved flow bandwidth for the data flow.

1 2. (Original) The method as recited in Claim 1, wherein:
2 the step of marking a first group of one or more packets includes the step of
3 storing a first differentiated services codepoint (DSCP) value in each
4 header of the first group of one or more packets of a data flow;
5 the step of determining a second behavioral treatment value includes the step of
6 determining a second DSCP value; and
7 the step of marking a second group of one or more packets includes the step of
8 storing the second DSCP value in each header of the second group of one
9 or more packets of a data flow.

1 3. (Currently Amended) The method as recited in Claim 1, ~~further comprising the~~
2 ~~steps of~~ wherein:

3 ~~determining packet flow characteristics of the first group of one or more packets~~
4 ~~of a data flow; and~~
5 determining the second behavioral treatment value is further based on the
6 available bandwidth within the network ~~and the packet flow characteristics~~
7 ~~of the first group of one or more packets of a data flow.~~

1 4. (Original) The method as recited in Claim 1, further comprising the steps of:
2 establishing a Quality of Service (QoS) policy for applying a per-hop-behavior
3 treatment for forwarding packets within a flow in said network; and
4 generating the first behavioral treatment value based on the established QoS
5 policy.

1 5. (Currently Amended) A computer-readable medium carrying one or more
2 sequences of instructions for marking one or more packets of data in a packet-
3 switched network based on achieved flow bandwidth information within the
4 network, wherein execution of the one or more sequences of instructions by one or
5 more processors causes the one or more processors to perform the steps of:
6 receiving a first group of one or more packets of a data flow ~~from~~ at a router in the
7 network;
8 marking the first group of one or more packets of said data flow with a first
9 behavioral treatment value, wherein the first behavioral treatment value
10 directs devices within the network to treat the first group of one or more
11 packets with a first quality of service treatment;

12 transmitting the first group of one or more packets of said data flow in the
13 network;
14 determining an achieved flow bandwidth for the data flow based on data traffic
15 within the network;
16 determining packet flow characteristics of the first group of one or more packets
17 of said data flow;
18 determining a second behavioral treatment value based on the achieved flow
19 bandwidth for the data flow within the network and on the packet flow
20 characteristics of the first group of one or more packets of the data flow;
21 receiving a second group of one or more packets of said data flow ~~from~~ at the
22 router in the network;
23 marking the second group of one or more packets of said data flow with said
24 second behavioral treatment value, wherein the second behavioral
25 treatment value directs devices within the network to treat the second
26 group of one or more packets with a second quality of service treatment
27 that is different than the first quality of service treatment; and
28 transmitting the second group of one or more packets of said data flow in the
29 network; and
30 repeating the preceding steps for successive groups of one or more packets of said
31 data flow, wherein each of the successive groups is dynamically marked
32 with a behavioral treatment value that is determined based at least in part
33 on a successively determined achieved flow bandwidth for the data flow.

1 6. (Original) The computer-readable medium as recited in Claim 5, wherein:

2 the step of marking a first group of one or more packets includes the step of
3 storing a first differentiated services codepoint (DSCP) value in each
4 header of the first group of one or more packets of a data flow;
5 the step of determining a second behavioral treatment value includes the step of
6 determining a second DSCP value; and
7 the step of marking a second group of one or more packets includes the step of
8 storing the second DSCP value in each header of the second group of one
9 or more packets of a data flow.

1 7. (Currently Amended) The computer-readable medium as recited in Claim 5,
2 ~~further comprising instructions for performing the steps of wherein:~~
3 ~~determining packet flow characteristics of the first group of one or more packets~~
4 ~~of a data flow; and~~
5 determining the second behavioral treatment value is further based on the
6 available bandwidth within the network ~~and the packet flow characteristics~~
7 ~~of the first group of one or more packets of a data flow.~~

1 8. (Original) The computer-readable medium as recited in Claim 5, further
2 comprising instructions for performing the steps of:
3 establishing a Quality of Service (QoS) policy for applying a per-hop-behavior
4 treatment for forwarding packets within a flow in said network; and
5 generating the first behavioral treatment value based on the established QoS
6 policy.

1 9. (Currently Amended) A computer apparatus comprising:

2 a processor; and

3 a memory coupled to the processor, the memory containing one or more

4 sequences of instructions for marking one or more packets of data in a

5 packet-switched network based on achieved flow bandwidth information

6 within the network, wherein execution of the one or more sequences of

7 instructions by the processor causes the processor to perform the steps of:

8 receiving a first group of one or more packets of a data flow from the

9 network;

10 marking the first group of one or more packets of said data flow with a

11 first behavioral treatment value, wherein the first behavioral

12 treatment value directs devices within the network to treat the first

13 group of one or more packets with a first quality of service treatment;

14 transmitting the first group of one or more packets of said data flow in the

15 network;

16 determining an achieved flow bandwidth for the data flow based on data

17 traffic within the network;

18 determining packet flow characteristics of the first group of one or more

19 packets of said data flow;

20 determining a second behavioral treatment value based on the achieved

21 flow bandwidth for the data flow within the network and on the

22 packet flow characteristics of the first group of one or more packets

23 of the data flow;

24 receiving a second group of one or more packets of said data flow from the
25 network;
26 marking the second group of one or more packets of said data flow with
27 said second behavioral treatment value, wherein the second
28 behavioral treatment value directs devices within the network to treat
29 the second group of one or more packets with a second quality of
30 service treatment that is different than the first quality of service
31 treatment; and
32 transmitting the second group of one or more packets of said data flow in
33 the network; and
34 repeating the preceding steps for successive groups of one or more packets
35 of said data flow, wherein each of the successive groups is
36 dynamically marked with a behavioral treatment value that is
37 determined based at least in part on a successively determined
38 achieved flow bandwidth for the data flow;
39 wherein the computer apparatus is any one of a bridge, a switch, and a router.

- 1 10. (Original) The computer apparatus as recited in Claim 9, wherein:
2 the step of marking a first group of one or more packets includes the step of
3 storing a first differentiated services codepoint (DSCP) value in each
4 header of the first group of one or more packets of a data flow;
5 the step of determining a second behavioral treatment value includes the step of
6 determining a second DSCP value; and

7 the step of marking a second group of one or more packets includes the step of
8 storing the second DSCP value in each header of the second group of one
9 or more packets of a data flow.

1 11. (Currently Amended) The computer apparatus as recited in Claim 9, ~~further~~
2 ~~comprising instructions for performing the steps of wherein:~~
3 ~~determining packet flow characteristics of the first group of one or more packets~~
4 ~~of a data flow; and~~
5 determining the second behavioral treatment value is further based on the
6 available bandwidth within the network ~~and the packet flow characteristics~~
7 ~~of the first group of one or more packets of a data flow.~~

1 12. (Original) The computer apparatus as recited in Claim 9, further comprising
2 instructions for performing the steps of:
3 establishing a Quality of Service (QoS) policy for applying a per-hop-behavior
4 treatment for forwarding packets within a flow in said network; and
5 generating the first behavioral treatment value based on the established QoS
6 policy.

1 13. (Currently Amended) A network device configured for marking one or more
2 packets of data in a packet-switched network based on achieved flow bandwidth
3 information within the network, comprising:
4 means for receiving a first group of one or more packets of a data flow from the
5 network;

6 means for marking the first group of one or more packets of said data flow with a
7 first behavioral treatment value, wherein the first behavioral treatment
8 value directs devices within the network to treat the first group of one or
9 more packets with a first quality of service treatment;

10 means for transmitting the first group of one or more packets of said data flow in
11 the network;

12 means for determining an achieved flow bandwidth for the data flow based on
13 data traffic within the network;

14 means for determining packet flow characteristics of the first group of one or
15 more packets of said data flow;

16 means for determining a second behavioral treatment value based on the achieved
17 flow bandwidth for the data flow within the network and on the packet
18 flow characteristics of the first group of one or more packets of the data
19 flow;

20 means for receiving a second group of one or more packets of said data flow from
21 the network;

22 means for marking the second group of one or more packets of said data flow with
23 said second behavioral treatment value, wherein the second behavioral
24 treatment value directs devices within the network to treat the second
25 group of one or more packets with a second quality of service treatment
26 that is different than the first quality of service treatment; and

27 means for transmitting the second group of one or more packets of said data flow
28 in the network; and
29 means for repeating the preceding steps for successive groups of one or more
30 packets of said data flow, wherein each of the successive groups is
31 dynamically marked with a behavioral treatment value that is determined
32 based at least in part on a successively determined achieved flow
33 bandwidth for the data flow;
34 wherein the network device is any one of a bridge, a switch, and a router.

1 14. (Currently Amended) A method for marking one or more packets of data in a
2 packet-switched network based on achieved flow bandwidth information
3 within the network, comprising the computer-implemented steps of:
4 causing one or more network devices to receive a first group of one or more
5 packets of a data flow from the network;
6 causing the one or more network devices to mark the first group of one or
7 more packets of said data flow with a first behavioral treatment value,
8 wherein the first behavioral treatment value directs devices within the
9 network to treat the first group of one or more packets with a first
10 quality of service treatment;
11 causing the one or more network devices to transmit the first group of one or
12 more packets of said data flow in the network;
13 determining an achieved flow bandwidth for the data flow based on data
14 traffic within the network;

15 determining packet flow characteristics of the first group of one or more
16 packets of said data flow;
17 determining a second behavioral treatment value based on the achieved flow
18 bandwidth for the data flow within the network and on the packet flow
19 characteristics of the first group of one or more packets of the data
20 flow;
21 causing the one or more network devices to receive a second group of one or
22 more packets of said data flow from the network;
23 causing the one or more network devices to mark the second group of one or
24 more packets of said data flow with said second behavioral treatment
25 value, wherein the second behavioral treatment value directs devices
26 within the network to treat the second group of one or more packets
27 with a second quality of service treatment that is different than the first
28 quality of service treatment; and
29 causing the one or more network devices to transmit the second group of one
30 or more packets of said data flow in the network; and
31 causing the one or more network devices to repeat the preceding steps for
32 successive groups of one or more packets of said data flow, wherein
33 each of the successive groups is dynamically marked with a behavioral
34 treatment value that is determined based at least in part on a
35 successively determined achieved flow bandwidth for the data flow.

- 1 15. (Previously Presented) The method as in claim 1, wherein the first behavioral
2 treatment is determined without regard to the achieved flow bandwidth.

1 16. (Previously Presented) The method as in claim 1, wherein the second behavioral
2 treatment is a behavioral treatment that provides a lower level of service than
3 other available choices of behavioral treatments; and
4 wherein the second behavioral treatment provides a high enough level of service
5 to accommodate the achieved flow bandwidth.

1 17. (Previously Presented) The method as in claim 1, wherein the second behavioral
2 treatment is a behavioral treatment that provides a minimum level of service that
3 is a sufficient level of service to accommodate the achieved flow bandwidth.

1 18. (Previously Presented) The method as in claim 1, wherein the step of marking the
2 first group is performed by at least communicating the first behavioral treatment
3 to a differentiated services node located at a border of a differentiated services
4 domain; and
5 wherein the step of marking the second group is performed by at least
6 communicating the second behavioral treatment to the differentiated
7 services node.

1 19. (Canceled)

1 20. (Canceled)

1 21. (Previously Presented) The method as in claim 1, wherein the step of determining
2 the achieved flow bandwidth is performed by at least estimating the achieved flow
3 bandwidth based on Management Information Base (MIB) variables.

1 22. (Previously Presented) The method as in claim 1, wherein the step of determining
2 the achieved flow bandwidth is performed by at least checking a Transfer Control
3 Protocol/ Internet Protocol (TCP/IP) window size and determining a value for the
4 achieved flow bandwidth based on the TCP/IP window size.

1 23. (Previously Presented) The method as in claim 1, wherein the step of determining
2 the achieved flow bandwidth is based on reception quality feedback from a Real-
3 Time Transport Protocol (RTP) receiver.

1 24. (Currently Amended) A method for marking one or more packets of data in a
2 packet-switched network based on achieved flow bandwidth information within
3 the network, comprising the computer-implemented steps of:
4 receiving a first group of packets of a plurality of data flows ~~from~~ at a router in the
5 network;
6 marking the first group of packets of said plurality of data flows with an initial set
7 of behavioral treatment values, wherein the ~~first~~ initial set of behavioral
8 treatment values direct devices within the network to treat the first group
9 of packets with an initial set of quality of service treatments;
10 transmitting the first group of packets of said plurality of data flows in the
11 network;
12 determining achieved flow bandwidths, wherein an achieved flow bandwidth is
13 determined for each of the plurality of data flows based on data traffic
14 within the network;

15 determining packet flow characteristics of the first group of packets of said
16 plurality of data flows;
17 determining an updated set of behavioral treatment values based on the achieved
18 flow bandwidths within the network and on the packet flow characteristics
19 of the first group of packets;
20 receiving a second group of packets of said plurality of data flows ~~from~~ at the
21 router in the network;
22 after the steps of marking the first group and determining the updated set of
23 behavioral treatment values, marking the second group packets of said
24 plurality of data flows with said updated set of behavioral treatment
25 values, wherein the updated set of behavioral treatment values direct
26 devices within the network to treat the second group of packets with an
27 updated set of quality of service treatments that is different than the initial
28 set of quality of service treatments; and
29 transmitting the second group of packets of said plurality of data flows in the
30 network; and
31 repeating the preceding steps for successive groups of packets of said plurality of
32 data flows, wherein each of the successive groups is dynamically marked
33 with a set of behavioral treatment values that is determined based at least
34 in part on successively determined achieved flow bandwidths for said
35 plurality of data flows.

- 1 25. (Currently Amended) A method for performing packet marking comprising the
2 computer-implemented steps of:

3 defining an initial set of Quality of Service (QoS) values for coloring packets
4 within a plurality of data flows, wherein each of the QoS values indicates
5 an allocation of bandwidth;
6 coloring a first group of one or more packets of a given data flow selected from
7 the plurality of data flows, without regard to an achieved flow bandwidth,
8 by at least:
9 communicating the initial set of QoS values to each of one or more edge
10 differentiated services domain nodes that are located at one or
11 more edges of a differentiated services domain, and
12 the one or more edge differentiated services domain nodes using one or
13 more of the initial set of QoS values to color the first group;
14 estimating traffic bandwidth within the network based on bandwidth information
15 corresponding to a current traffic pattern of the network, wherein the
16 traffic bandwidth estimated includes an achieved flow bandwidth for the
17 given data flow;
18 determining packet flow characteristics of the first group of one or more packets
19 of the given data flow;
20 determining an updated set of QoS values for coloring packets within the plurality
21 of data flows, based on the traffic bandwidth estimated and on the packet
22 flow characteristics of the first group of one or more packets,
23 wherein the updated set of QoS values provide lower levels of service than
24 other available choices of QoS values, and

25 wherein the updated set of QoS values provide a high enough level of
26 service to accommodate the traffic bandwidth estimated;
27 coloring a subsequent group of one or more packets of the given data flow with
28 the one or more of updated set of QoS values by at least;
29 communicating the updated set of QoS values to each of one or more edge
30 differentiated services domain nodes, and
31 the one or more edge differentiated services domain nodes using one or
32 more of the updated set of QoS values to color the subsequent
33 group; and
34 repeating the steps of estimating traffic bandwidth, determining packet flow
35 characteristics, determining an updated set of QoS values, and coloring a
36 subsequent group multiple times, therein tuning the network on an
37 ongoing basis.

1 26. (Previously Presented) The method as in claim 24, wherein the initial set of QoS
2 values is an initial set of Differentiated Services Codepoint (DSCP) values;
3 wherein the updated set of QoS values is an updated set of DSCP values;
4 wherein the step of estimating traffic bandwidth further comprises the steps of:
5 defining one or more QoS policies that specify target bandwidth values
6 and a range of possible services for each the plurality of data
7 flows, wherein a given target bandwidth value is specified for the
8 given data flow, and wherein the given target bandwidth identifies
9 a specific bandwidth that is desirous or required by the given data
10 flow;

11 gathering information about the traffic bandwidth; and
12 determining the traffic bandwidth based on the information gathered.

1 27. (Previously Presented) The method of claim 1, wherein the data flow is
2 associated with only one behavioral treatment at any given time.

1 28. (Previously Presented) The method of claim 24, wherein each data flow is
2 associated with only one behavioral treatment at any given time.

1 29. (Previously Presented) The method of claim 1, wherein the achieved flow
2 bandwidth is a percentage of the network bandwidth.

1 30. (Previously Presented) The method claim 29, wherein the second behavioral
2 treatment results in the data flow having a different achieved flow bandwidth,
3 which is a different percentage of the network bandwidth.

1 31. (Previously Presented) The method of claim 1, wherein the determining of the
2 second behavioral treatment is in response to a determination of achieved flow
3 bandwidth resulting from the determining of the achieved flow bandwidth.

1 32. (Previously Presented) The computer-readable medium as in claim 5, wherein the
2 first behavioral treatment is determined without regard to the achieved flow
3 bandwidth.

1 33. (Previously Presented) The computer-readable medium as in claim 5, wherein the
2 second behavioral treatment is a behavioral treatment that provides a lower level
3 of service than other available choices of behavioral treatments; and

4 wherein the second behavioral treatment provides a high enough level of service
5 to accommodate the achieved flow bandwidth.

1 34. (Previously Presented) The computer-readable medium as in claim 5, wherein the
2 second behavioral treatment is a behavioral treatment that provides a minimum
3 level of service that is a sufficient level of service to accommodate the achieved
4 flow bandwidth.

1 35. (Previously Presented) The computer-readable medium as in claim 5, wherein the
2 step of marking the first group is performed by at least communicating the first
3 behavioral treatment to a differentiated services node located at a border of a
4 differentiated services domain; and
5 wherein the step of marking the second group is performed by at least
6 communicating the second behavioral treatment to the differentiated
7 services node.

1 36. (Canceled)

1 37. (Canceled)

1 38. (Previously Presented) The computer-readable medium as in claim 5, wherein the
2 step of determining the achieved flow bandwidth is performed by at least
3 estimating the achieved flow bandwidth based on Management Information Base
4 (MIB) variables.

1 39. (Previously Presented) The computer-readable medium as in claim 5, wherein the
2 step of determining the achieved flow bandwidth is performed by at least

3 checking a Transfer Control Protocol/ Internet Protocol (TCP/IP) window size
4 and determining a value for the achieved flow bandwidth based on the TCP/IP
5 window size.

1 40. (Previously Presented) The computer-readable medium as in claim 5, wherein the
2 step of determining the achieved flow bandwidth is based on reception quality
3 feedback from a Real-Time Transport Protocol (RTP) receiver.

1 41. (Currently Amended) A computer-readable medium carrying one or more
2 sequences of instructions for marking one or more packets of data in a packet-
3 switched network based on achieved flow bandwidth information within the
4 network, wherein execution of the one or more sequences of instructions by one or
5 more processors causes the one or more processors to perform the ~~method~~
6 comprising steps of:

7 receiving a first group of packets of a plurality of data flows ~~from~~ at a router in the
8 network;

9 marking the first group of packets of said plurality of data flows with an initial set
10 of behavioral treatment values, wherein the ~~first~~ initial set of behavioral
11 treatment values direct devices within the network to treat the first group
12 of packets with an initial set of quality of service treatments;

13 transmitting the first group of packets of said plurality of data flows in the
14 network;

15 determining achieved flow bandwidths, wherein an achieved flow bandwidth is
16 determined for each of the plurality of data flows based on data traffic
17 within the network;
18 determining packet flow characteristics of the first group of packets of said
19 plurality of data flows;
20 determining an updated set of behavioral treatment values based on the achieved
21 flow bandwidths within the network and on the packet flow characteristics
22 of the first group of packets;
23 receiving a second group of packets of said plurality of data flows ~~from~~ at the
24 router in the network;
25 after the steps of marking the first group and determining the updated set of
26 behavioral treatment values, marking the second group packets of said
27 plurality of data flows with said updated set of behavioral treatment
28 values, wherein the updated set of behavioral treatment values direct
29 devices within the network to treat the second group of packets with an
30 updated set of quality of service treatments that is different than the initial
31 set of quality of service treatments; and
32 transmitting the second group of packets of said plurality of data flows in the
33 network; and
34 repeating the preceding steps for successive groups of packets of said plurality of
35 data flows, wherein each of the successive groups is dynamically marked
36 with a set of behavioral treatment values that is determined based at least

37 in part on successively determined achieved flow bandwidths for said
38 plurality of data flows.

1 42. (Currently Amended) A computer-readable medium carrying one or more
2 sequences of instructions for marking one or more packets of data in a packet-
3 switched network based on achieved flow bandwidth information within the
4 network, wherein execution of the one or more sequences of instructions by one
5 or more processors causes the one or more processors to perform the ~~method~~
6 comprising steps of:
7 defining an initial set of Quality of Service (QoS) values for coloring packets
8 within a plurality of data flows, wherein each of the QoS values indicates
9 an allocation of bandwidth;
10 coloring a first group of one or more packets of a given data flow selected from
11 the plurality of data flows, without regard to an achieved flow bandwidth,
12 by at least:
13 communicating the initial set of QoS values to each of one or more edge
14 differentiated services domain nodes that are located at one or
15 more edges of a differentiated services domain, and
16 the one or more edge differentiated services domain nodes using one or
17 more of the initial set of QoS values to color the first group;
18 estimating traffic bandwidth within the network based on bandwidth information
19 corresponding to a current traffic pattern of the network, wherein the
20 traffic bandwidth estimated includes an achieved flow bandwidth for the
21 given data flow;

22 determining packet flow characteristics of the first group of one or more packets
23 of the given data flow;
24 determining an updated set of QoS values for coloring packets within the plurality
25 of data flows, based on the traffic bandwidth estimated and on the packet
26 flow characteristics of the first group of one or more packets,
27 wherein the updated set of QoS values provide lower levels of service than
28 other available choices of QoS values, and
29 wherein the updated set of QoS values provide a high enough level of
30 service to accommodate the traffic bandwidth estimated;
31 coloring a subsequent group of one or more packets of the given data flow with
32 the one or more of updated set of QoS values by at least;
33 communicating the updated set of QoS values to each of one or more edge
34 differentiated services domain nodes, and
35 the one or more edge differentiated services domain nodes using one or
36 more of the updated set of QoS values to color the subsequent
37 group; and
38 repeating the steps of estimating traffic bandwidth, determining packet flow
39 characteristics, determining an updated set of QoS values, and coloring a
40 subsequent group multiple times, therein tuning the network on an
41 ongoing basis.

- 1 43. (Previously Presented) The computer-readable medium as in claim 41, wherein
2 the initial set of QoS values is an initial set of Differentiated Services Codepoint
3 (DSCP) values;

4 wherein the updated set of QoS values is an updated set of DSCP values;
5 wherein the step of estimating traffic bandwidth further comprises the steps of:
6 defining one or more QoS policies that specify target bandwidth values
7 and a range of possible services for each the plurality of data
8 flows, wherein a given target bandwidth value is specified for the
9 given data flow, and wherein the given target bandwidth identifies
10 a specific bandwidth that is desirous or required by the given data
11 flow;
12 gathering information about the traffic bandwidth; and
13 determining the traffic bandwidth based on the information gathered.

1 44. (Previously Presented) The computer-readable medium of claim 5, wherein the
2 data flow is associated with only one behavioral treatment at any given time.

1 45. (Previously Presented) The computer readable medium of claim 41, wherein each
2 data flow is associated with only one behavioral treatment at any given time.

1 46. (Previously Presented) The computer-readable medium of claim 5, wherein the
2 achieved flow bandwidth is a percentage of the network bandwidth.

1 47. (Previously Presented) The computer-readable medium claim 46, wherein the
2 second behavioral treatment results in the data flow having a different achieved
3 flow bandwidth, which is a different percentage of the network bandwidth.

1 48. (Previously Presented) The computer-readable medium of claim 5, wherein the
2 determining of the second behavioral treatment is in response to a determination

3 of achieved flow bandwidth resulting from the determining of the achieved flow
4 bandwidth.

1 49. (Previously Presented) The computer apparatus as in claim 9, wherein the first
2 behavioral treatment is determined without regard to the achieved flow
3 bandwidth.

1 50. (Previously Presented) The computer apparatus as in claim 9, wherein the second
2 behavioral treatment is a behavioral treatment that provides a lower level of
3 service than other available choices of behavioral treatments; and
4 wherein the second behavioral treatment provides a high enough level of service
5 to accommodate the achieved flow bandwidth.

1 51. (Previously Presented) The computer apparatus as in claim 9, wherein the second
2 behavioral treatment is a behavioral treatment that provides a minimum level of
3 service that is a sufficient level of service to accommodate the achieved flow
4 bandwidth.

1 52. (Previously Presented) The computer apparatus as in claim 9, wherein the step of
2 marking the first group is performed by at least communicating the first
3 behavioral treatment to a differentiated services node located at a border of a
4 differentiated services domain; and
5 wherein the step of marking the second group is performed by at least
6 communicating the second behavioral treatment to the differentiated
7 services node.

1 53. (Canceled)

1 54. (Canceled)

1 55. (Previously Presented) The computer apparatus as in claim 9, wherein the step of
2 determining the achieved flow bandwidth is performed by at least estimating the
3 achieved flow bandwidth based on Management Information Base (MIB)
4 variables.

1 56. (Previously Presented) The computer apparatus as in claim 9, wherein the step of
2 determining the achieved flow bandwidth is performed by at least checking a
3 Transfer Control Protocol/ Internet Protocol (TCP/IP) window size and
4 determining a value for the achieved flow bandwidth based on the TCP/IP
5 window size.

1 57. (Previously Presented) The computer apparatus as in claim 9, wherein the step of
2 determining the achieved flow bandwidth is based on reception quality feedback
3 from a Real-Time Transport Protocol (RTP) receiver.

1 58. (Currently Amended) A computer apparatus comprising:
2 a processor; and
3 a memory coupled to the processor, the memory containing one or more
4 sequences of instructions for marking one or more packets of data in a
5 packet-switched network based on achieved flow bandwidth information
6 within the network, wherein execution of the one or more sequences of

7 instructions by the processor causes the processor to perform the ~~method~~
8 ~~including at least~~ steps of:
9 receiving a first group of packets of a plurality of data flows from the network;
10 marking the first group of packets of said plurality of data flows with an initial set
11 of behavioral treatment values, wherein the ~~first~~ initial set of behavioral
12 treatment values direct devices within the network to treat the first group
13 of packets with an initial set of quality of service treatments;
14 transmitting the first group of packets of said plurality of data flows in the
15 network;
16 determining achieved flow bandwidths, wherein an achieved flow bandwidth is
17 determined for each of the plurality of data flows based on data traffic
18 within the network;
19 determining packet flow characteristics of the first group of packets of said
20 plurality of data flows;
21 determining an updated set of behavioral treatment values based on the achieved
22 flow bandwidths within the network and on the packet flow characteristics
23 of the first group of packets;
24 receiving a second group of packets of said plurality of data flows from the
25 network;
26 after the steps of marking the first group and determining the updated set of
27 behavioral treatment values, marking the second group packets of said
28 plurality of data flows with said updated set of behavioral treatment
29 values, wherein the updated set of behavioral treatment values direct

30 devices within the network to treat the second group of packets with an
31 updated set of quality of service treatments that is different than the initial
32 set of quality of service treatments; and
33 transmitting the second group of packets of said plurality of data flows in the
34 network; and
35 repeating the preceding steps for successive groups of packets of said plurality of
36 data flows, wherein each of the successive groups is dynamically marked
37 with a set of behavioral treatment values that is determined based at least
38 in part on successively determined achieved flow bandwidths for said
39 plurality of data flows;
40 wherein the computer apparatus is any one of a bridge, a switch, and a router.

1 59. (Currently Amended) A computer apparatus comprising:
2 a processor; and
3 a memory coupled to the processor, the memory containing one or more
4 sequences of instructions for marking one or more packets of data in a
5 packet-switched network based on achieved flow bandwidth information
6 within the network, wherein execution of the one or more sequences of
7 instructions by the processor causes the processor to perform the ~~method~~
8 ~~including at least~~ steps of:
9 defining an initial set of Quality of Service (QoS) values for coloring packets
10 within a plurality of data flows, wherein each of the QoS values indicates
11 an allocation of bandwidth;

12 coloring a first group of one or more packets of a given data flow selected from
13 the plurality of data flows, without regard to an achieved flow bandwidth,
14 by at least:
15 communicating the initial set of QoS values to each of one or more edge
16 differentiated services domain nodes that are located at one or
17 more edges of a differentiated services domain, and
18 the one or more edge differentiated services domain nodes using one or
19 more of the initial set of QoS values to color the first group;
20 estimating traffic bandwidth within the network based on bandwidth information
21 corresponding to a current traffic pattern of the network, wherein the
22 traffic bandwidth estimated includes an achieved flow bandwidth for the
23 given data flow;
24 determining packet flow characteristics of the first group of one or more packets
25 of the given data flow;
26 determining an updated set of QoS values for coloring packets within the plurality
27 of data flows, based on the traffic bandwidth estimated and on the packet
28 flow characteristics of the first group of one or more packets,
29 wherein the updated set of QoS values provide lower levels of service than
30 other available choices of QoS values, and
31 wherein the updated set of QoS values provide a high enough level of
32 service to accommodate the traffic bandwidth estimated;
33 coloring a subsequent group of one or more packets of the given data flow with
34 the one or more of updated set of QoS values by at least;

35 communicating the updated set of QoS values to each of one or more edge
36 differentiated services domain nodes, and
37 the one or more edge differentiated services domain nodes using one or
38 more of the updated set of QoS values to color the subsequent
39 group; and
40 repeating the steps of estimating traffic bandwidth, determining packet flow
41 characteristics, determining an updated set of QoS values, and coloring a
42 subsequent group multiple times, therein tuning the network on an
43 ongoing basis;
44 wherein the computer apparatus is any one of a bridge, a switch, and a router.

1 60. (Previously Presented) The computer apparatus as in claim 58, wherein the initial
2 set of QoS values is an initial set of Differentiated Services Codepoint (DSCP)
3 values;
4 wherein the updated set of QoS values is an updated set of DSCP values;
5 wherein the step of estimating traffic bandwidth further comprises the steps of:
6 defining one or more QoS policies that specify target bandwidth values
7 and a range of possible services for each the plurality of data
8 flows, wherein a given target bandwidth value is specified for the
9 given data flow, and wherein the given target bandwidth identifies
10 a specific bandwidth that is desirous or required by the given data
11 flow;
12 gathering information about the traffic bandwidth; and
13 determining the traffic bandwidth based on the information gathered.

1 61. (Previously Presented) The computer apparatus of claim 9, wherein the data flow
2 is associated with only one behavioral treatment at any given time.

1 62. (Previously Presented) The computer apparatus of claim 58, wherein each data
2 flow is associated with only one behavioral treatment at any given time.

1 63. (Previously Presented) The computer apparatus of claim 9, wherein the achieved
2 flow bandwidth is a percentage of the network bandwidth.

1 64. (Previously Presented) The computer apparatus claim 63, wherein the second
2 behavioral treatment results in the dataflow having a different achieved flow
3 bandwidth, which is a different percentage of the network bandwidth.

1 65. (Previously Presented) The computer apparatus of claim 9, wherein the
2 determining of the second behavioral treatment is in response to a determination
3 of achieved flow bandwidth resulting from the determining of the achieved flow
4 bandwidth.